

WHAT IS CLAIMED IS

1. An ultra-thin copper foil with a carrier
comprised of a carrier foil, a peeling layer, and an
ultra-thin copper foil, wherein said ultra-thin copper
5 foil and said peeling layer are provided between them
with a strike plating layer and wherein said ultra-thin
copper foil and said strike plating layer are one of a
phosphorus-containing copper layer and a phosphorus-
containing copper alloy layer.
- 10 2. An ultra-thin copper foil with a carrier
comprised of a carrier foil, a peeling layer, and an
ultra-thin copper foil, wherein said ultra-thin copper
foil and said peeling layer are provided between them
with a strike plating layer comprised of one of a
15 phosphorus-containing copper layer and a phosphorus-
containing copper alloy layer, said strike plating layer
is provided on it with a copper plating ultra-thin layer,
and said ultra-thin layer is provided on it with said
ultra-thin copper foil comprised of one of copper and a
20 copper alloy.
3. An ultra-thin copper foil with a carrier
comprised of a carrier foil, a peeling layer, and an
ultra-thin copper foil, wherein said ultra-thin copper
foil and said peeling layer are provided between them
25 with a strike plating layer comprised of one of a

phosphorus-containing copper layer and a phosphorus-containing copper alloy layer, said strike plating layer is provided on it with a copper plating ultra-thin layer, and said ultra-thin layer is provided on it with said
5 ultra-thin copper foil comprised of one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer.

4. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an
10 ultra-thin copper foil, wherein said ultra-thin copper foil and said peeling layer are provided between them with a strike plating layer comprised of one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer, said strike plating layer
15 is provided on it with an ultra-thin layer comprised of one of a phosphorus-containing copper layer and phosphorus-containing copper alloy layer, and the ultra-thin layer is provided on it with said ultra-thin copper foil comprised of one of copper and a copper alloy.

20 5. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil, wherein said ultra-thin copper foil and said peeling layer are provided between them with a strike plating layer comprised of one of a
25 phosphorus-containing copper layer and a phosphorus-

containing copper alloy layer, said strike plating layer is provided on it with an ultra-thin layer comprised of one of a phosphorus-containing copper layer and phosphorus-containing copper alloy layer, and the ultra-
5 thin layer is provided on it with said ultra-thin copper foil comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy.

6. An ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an
10 ultra-thin copper foil, wherein a surface roughness R_z of a surface of the carrier foil on the ultra-thin copper foil side is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$, a surface roughness R_z of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on said carrier foil
15 surface is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$, one of a copper and copper alloy layer covering at least 90% of the area of the surface of the peeling layer is formed at a position of the surface roughness R_z of the ultra-thin copper foil plus $0.1\ \mu\text{m}$ to $0.2\ \mu\text{m}$ at the ultra-thin copper foil side
20 from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is $0.01\ \text{KN/m}$ to $0.05\ \text{KN/m}$.

7. An ultra-thin copper foil with a carrier
25 comprised of a carrier foil, a peeling layer, and an

ultra-thin copper foil, wherein a surface roughness R_z of a surface of the carrier foil on the ultra-thin copper foil side is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$, a surface roughness R_z of a carrier foil side of the ultra-thin copper foil provided
5 on the peeling layer provided on said carrier foil surface is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$, one of a copper and copper alloy layer having a conductivity of at least 90% is formed at a position of the surface roughness R_z of the ultra-thin copper foil plus $0.1\ \mu\text{m}$ to $0.2\ \mu\text{m}$ at the
10 ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is $0.01\ \text{KN/m}$ to $0.05\ \text{KN/m}$.

8. An ultra-thin copper foil with a carrier as set
15 forth in any one of claims 1 to 5, wherein the surface roughness R_z of the carrier foil surface at the ultra-thin copper foil side is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$ and the peel strength after hot bonding of at least 300°C is $0.01\ \text{KN/m}$ to $0.05\ \text{KN/m}$.

20 9. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 5, wherein a surface roughness R_z of a surface of the carrier foil on the ultra-thin copper foil side is $0.1\ \mu\text{m}$ to $5\ \mu\text{m}$, a surface roughness R_z of a carrier foil side of the ultra-thin
25 copper foil provided on the peeling layer provided on

said carrier foil surface is 0.1 μm to 5 μm , one of a copper and copper alloy layer covering at least 90% of the area of the peeling layer surface is formed at a position of the surface roughness R_z of the ultra-thin copper foil plus 0.1 μm to 0.2 μm at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is 0.01 KN/m to 0.05 KN/m.

10 10. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 5, wherein a surface roughness R_z of a surface of the carrier foil on the ultra-thin copper foil side is 0.1 μm to 5 μm , a surface roughness R_z of a carrier foil side of the ultra-thin copper foil provided on the peeling layer provided on
15 said carrier foil surface is 0.1 μm to 5 μm , one of a copper and copper alloy layer having a conductivity of at least 90% is formed at a position of the surface roughness R_z of the ultra-thin copper foil plus 0.1 μm to
20 0.2 μm at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and a peel strength after hot bonding of at least 300°C is 0.01 KN/m to 0.05 KN/m.

25 11. An ultra-thin copper foil with a carrier as set

forth in any one of claims 1 to 7, wherein said peeling layer is one of a chromium metal and chromium alloy.

12. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7, wherein said peeling
5 layer is one of an oxide hydrate of a chromium metal and chromium alloy.

13. An ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7, wherein said peeling layer is formed by one of a chromium metal, chromium
10 alloy, and oxide hydrate of one of a chromium metal and chromium alloy.

14. An ultra-thin copper foil with a carrier as set forth in claim 11, wherein the amount of deposited metal of one of a chromium metal and chromium alloy of the
15 peeling layer is not more than 4.5 mg/dm^2 .

15. An ultra-thin copper foil with a carrier as set forth in claim 12, wherein the amount of deposited metal of one of a chromium metal and chromium alloy in the peeling layer comprised of an oxide hydrate is not more
20 than 0.015 mg/dm^2 .

16. An ultra-thin copper foil with a carrier as set forth in claim 13, wherein the amount of deposited metal of one of a chromium metal and chromium alloy of the peeling layer is not more than 4.5 mg/dm^2 .

25 17. An ultra-thin copper foil with a carrier as set

forth in any one of claims 1 and 5 to 7, wherein said peeling layer is one of nickel, iron, an alloy of the same, and an oxide hydrate containing the same.

18. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, forming on the peeling layer one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, and forming on it by plating an ultra-thin copper foil comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy.

19. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer in one of a phosphorus-containing copper and a phosphorus-containing

copper alloy plating bath, forming on the strike plating layer an ultra-thin layer by one of a copper and a copper alloy plating, and forming on the ultra-thin layer an ultra-thin copper foil by one of a copper and a copper alloy plating.

20. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer by one of a copper and a copper alloy plating, and forming on the ultra-thin layer an ultra-thin copper foil by one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating.

21. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form

a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy, and forming on the ultra-thin layer an ultra-thin copper foil by one of a copper and a copper alloy plating.

22. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including plating the surface of the carrier foil with one of chromium, nickel, iron, and an alloy of the same to form a peeling layer, strike plating the peeling layer with one of a phosphorus-containing copper layer and a phosphorus-containing copper alloy layer by strike plating in one of a phosphorus-containing copper and a phosphorus-containing copper alloy plating bath, forming on the strike plating layer an ultra-thin layer comprised of one of a phosphorus-containing copper and a phosphorus-containing copper alloy, and forming on the ultra-thin layer an ultra-thin copper foil by one of a phosphorus-containing copper and a phosphorus-containing

copper alloy plating.

23. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including
5 forming on the surface of the carrier foil having a surface roughness R_z of $0.1\text{ }\mu\text{m}$ to $5\text{ }\mu\text{m}$ a peeling layer, forming on the peeling layer an ultra-thin copper foil to give a surface roughness R_z of a carrier foil side of $0.1\text{ }\mu\text{m}$ to $5\text{ }\mu\text{m}$, forming a strike plating layer by one of a
10 pH3 to pH13 phosphorus-containing/not containing copper and phosphorus-containing/not containing copper alloy plating bath so that at least 90% of the area of the peeling layer surface is covered by a copper layer at a position of the surface roughness R_z of the ultra-thin
15 copper foil plus $0.1\text{ }\mu\text{m}$ to $0.2\text{ }\mu\text{m}$ at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and forming on the strike plating layer one of a phosphorus-containing/not containing copper and copper
20 alloy layer as the ultra-thin copper foil of a predetermined thickness.

24. A method of production of an ultra-thin copper foil with a carrier comprised of a carrier foil, a peeling layer, and an ultra-thin copper foil including
25 forming on the surface of the carrier foil having a

surface roughness R_z of $0.1\text{ }\mu\text{m}$ to $5\text{ }\mu\text{m}$ a peeling layer, forming on the peeling layer an ultra-thin copper foil to give a surface roughness R_z of a carrier foil side of $0.1\text{ }\mu\text{m}$ to $5\text{ }\mu\text{m}$, forming a strike plating layer by one of a
5 pH3 to pH13 phosphorus-containing/not containing copper and phosphorus-containing/not containing copper alloy plating bath so as to give a copper layer having a conductivity of at least 90% at a position of the surface roughness R_z of the ultra-thin copper foil plus $0.1\text{ }\mu\text{m}$ to
10 $0.2\text{ }\mu\text{m}$ at the ultra-thin copper foil side from the projections of the surface relief on the carrier foil side of the ultra-thin copper foil, and forming on the strike plating layer one of a phosphorus-containing/not containing copper and copper alloy layer as the ultra-
15 thin copper foil of a predetermined thickness.

25. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in any one of claims 1 to 7 is used to form high density ultrafine interconnects.

20 26. A printed circuit board wherein an ultra-thin copper foil with a carrier produced by a method of production of an ultra-thin copper foil with a carrier as set forth in any one of claims 18 to 24 is used to form high density ultrafine interconnects.

25 27. A printed circuit board wherein an ultra-thin

copper foil with a carrier as set forth in claim 8 is used to form high density ultrafine interconnects.

28. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in claim 9 is
5 used to form high density ultrafine interconnects.

29. A printed circuit board wherein an ultra-thin copper foil with a carrier as set forth in claim 10 is used to form high density ultrafine interconnects.